



PHILOSOPHICAL  
TRANSACTIONS.

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XXII. *Account of the Manner in which the Russians treat Persons affected by the Fumes of burning Charcoal, and other Effluvia of the same Nature. In a Letter from Matthew Guthrie, M. D. to Joseph Priestley, LL.D. F. R. S.*

Read March 4, 1779.

DEAR SIR,

St. Petersburg,  
October 12, 1778.

I SHALL endeavour to recollect, according to your desire, the particulars of that part of my former letter which related to the mode of recovering people in Russia, who are apparently deprived of life by the prin-

ciple emitted from burning charcoal, or by the incrustation formed upon the insides of the boors huts when it thaws.

People of condition in this country have double windows to their houses in winter; but the commoner sort have only single ones, which is the reason that, during a severe frost, there is an incrustation formed upon the insides of the glass windows. This seems to be composed of condensed breath, perspiration, &c. as a number of people live and sleep in the same small room, especially in great cities. This excrementitious crust is farther impregnated with the phlogiston of candles, and of the oven with which the chamber is heated.

When a thaw succeeds a hard frost of long duration, and this plate of ice is converted into water, there is a principle set loose, which produces all the terrible effects upon the human body which the principle emitted from charcoal is so well known to do in this country, where people every day suffer from it. However, the Russians constantly lay the blame upon the oven, when they are affected by the thawing of the crust, as the effects are perfectly similar, and they cannot bring themselves to believe, that the dissolving of so small a portion of ice can be attended with any bad consequence, when they daily melt larger masses without danger: yet the oven  
does

does not at all account for the complaints brought on at this period; for, upon examination, they generally find every thing right there, and still the *ugar*, or hurtful vapour, remaining in the room.

As the effects of both are similar, as I have said above, and likewise the mode of recovery, I shall only give you an account of the operation of the principle emitted by burning charcoal, and of the method of bringing those people to life who have been *suffocated* by it (as I think it is erroneously termed); this will supersede the necessity of giving the history of both, or rather it will be giving both at the same time.

Russian houses are heated by the means of ovens; and the manner of heating them is as follows. A number of billets of wood are placed in the peech or stove, and allowed to burn till they fall in a mass of bright red cinders; then the vent above is shut up, and likewise the door of the peech which opens into the room, in order to concentrate the heat; this makes the tiles of which the peech is composed as hot as you desire, and sufficiently warms the apartment; but sometimes a servant is so negligent as to shut up the peech or oven before the wood is sufficiently burnt, for the red cinders should be turned over from time to time to see that no bit of wood remains of a blackish colour, but that the whole mass is

of a uniform glare (as if almost transparent) before the openings are shut, else the *ugar* or vapour is sure to succeed to mismanagement of this sort, and its effects are as follows.

If a person lays himself down to sleep in the room exposed to the influence of this vapour, he falls into so found a sleep that it is difficult to awake him, but he feels (or is sensible of) nothing. There is no spasm excited in the *trachea arteria* or lungs to rouse him, nor does the breathing, by all accounts, seem to be particularly affected: in short, there is no one symptom of suffocation; but towards the end of the catastrophe, a sort of groaning is heard by people in the next room, which brings them sometimes to the relief of the sufferer. If a person only sits down in the room, without intention to sleep, he is, after some time, seized with a drowsiness and inclination to vomit. However, this last symptom seldom affects a Russian, it is chiefly foreigners who are awakened to their dangers by a *nausea*; but the natives, in common with strangers, perceive a dull pain in their heads, and if they do not remove directly, which they are often too sleepy to do, are soon deprived of their senses and power of motion, inasmuch, that if no person fortunately discovers them within an hour after this worst stage, they are irrecoverably lost; for the Russians say, that they

do not succeed in restoring to life those who have lain more than an hour in a state of insensibility.

The recovery is always attempted, and often effected, in this manner. They carry the patient immediately out of doors, and lay him upon the snow, with nothing on him but a shirt and linen drawers. His stomach and temples are then well rubbed with snow, and cold water, or milk is poured down his throat. This friction is continued with fresh snow until the livid hue, which the body had when brought out, is changed to its natural colour, and life renewed; then they cure the violent head-ach which remains by binding on the forehead a cataplasm of black rye bread, and vinegar.

In this manner the unfortunate man is perfectly restored, without blowing up the lungs, as is necessary in the case of drowned persons; on the contrary, they begin to play of themselves so soon as the furcharge of phlogiston makes its escape from the body.

It is well worthy of observation, how diametrically opposite the modes are of restoring to life, those who are deprived of it by water, and those who have lost it by the fumes of charcoal: the one consisting in the internal and external application of heat, and the other in that of cold. It may be alledged, that the stimulus of the cold produces heat, and the fact seems to be confirmed by the Russian method of restoring circulation in a frozen limb

limb by means of friction with snow. But what is singular in the case of people apparently deprived of life in the manner treated of is, that the body is much warmer when brought out of the room than at the instant life is restored, and that they awake cold and shivering. The colour of the body is also changed from a livid red to its natural complexion, which, together with some other circumstances, would almost lead one to suspect, that they are restored to life by the snow and cold water somehow or other freeing them from the load of phlogiston with which the system seems to be replete; for although the first application of cold water to the human body produces heat, yet, if often repeated in a very cold atmosphere, it then cools instead of continuing to heat, just as the cold bath does when a person remains too long in it.

In short, I think it is altogether a curious subject, whether you take into consideration the mode of action of the principle emitted by burning charcoal, and our phlogificated crust; or the operation of the snow and cold water. However, I shall by no means take upon me to decide, whether the dangerous symptoms related above are produced by the air in the room being so saturated with phlogiston as to be unable to take up the proper quantity from the lungs, which occasions a surcharge in the system, according to your theory, or whether

ther so subtle a fluid may somehow find its way into the circulation, and thereby arrest the vital powers; nor shall I determine whether the livid hue of the body when brought out is changed into a paler colour by the atmosphere somehow or other absorbing and freeing the blood from the colouring principle, as you have shewn to be the case with blood out of the body: these are curious inquiries that I shall leave to your investigation. I have only endeavoured to collect facts from a number of natives who have met with this accident themselves, or have assisted in restoring others to life. It is so common a case here that it is perfectly familiar to them, and they never call in medical assistance.

I am, &c.

